

## REMARKS

### **Introduction**

Reconsideration of the present application as amended in view of the remarks below is respectfully requested. Claims 1-3, 5, and 9-20 are currently pending. Claims 13, 16, and 19 have been amended. Claims 21-25 have been added. Upon entry of the above amendments, claims 1-3, 5, 9-25 will be pending in this application.

### **Specification Objected to**

The Examiner states that the title of the invention is not descriptive. Applicants do, however, believe that the title is descriptive of the invention. As detailed below with respect to the claims, Applicants believe that the invention is directed to a bipolar delta-sigma modulator. 37 CFR 1.72 states as follows:

(a) The title of the invention may not exceed 500 characters in length and must be as short and specific as possible. Characters that cannot be captured and recorded in the Office's automated information systems may not be reflected in the Office's records in such systems or in documents created by the Office. Unless the title is supplied in an application data sheet (§1.76) the title of the invention should appear as a heading on the first page of the specification.

Applicants believe that the title is as short and specific as possible, is descriptive of the invention, and meets the requirements of the 37 CFR 1.72. Should the Examiner disagree with Applicants' title, Applicants respectfully request the Examiner to suggest a title for further discussion.

The disclosure is objected to because it includes an embedded hyperlink and/or other form of browser-executable code on page 9, last paragraph. Applicants have amended the last paragraph on page 9, as previously stated above, and believe that the objection has been overcome.

### **Drawings Objected to**

The Examiner has stated that the application has been filed with informal drawings and that formal drawings will be required when the application is allowed. Upon allowance, Applicants will submit the requested formal drawings.

The Examiner has stated that Figures 3B and 4B should be designated by a legend such as –Prior Art—because only that which is old is illustrated. Applicants submit herewith replacement drawings for Figures 3B and 4B. Applicants believe that submission of these drawings overcomes the Examiner’s objection.

#### **Claim Objections**

Claims 16 and 19 have been objected to. In view of this objection, Applicants have amended claims 16 and 19. Applicants believe that these amendments overcome the Examiner’s objection.

#### **Claim rejections 35 U.S.C. § 102**

Claims 1-3, 11, 13, and 14 have been rejected under 35 U.S.C. § 102(b) as being anticipated by Pace P.E. et al. cited in an IDS filed on May 2, 2006, reference CB. Pace describes a sigma-delta modulator including an analog filter and a quantizer enclosed in a feedback loop. First order and second sigma delta modulators are described. An output for a first order modulator is shown in Figure 2 and an output for a second order modulator is shown in Figure 4.

An integrated optical single bit modulator uses two Mach-Zehnder interferometers as described in Section 3, beginning on page 3. As stated in section 3.1.1, left column last paragraph, the method of accumulation involves the magnitude of the signal to be accumulated and the direction of the accumulation. One interferometer provides the magnitude for the accumulator and the other interferometer is used to determine the direction of the interferometer. Figure 11 plots the transfer characteristic of the first order integrated optical integrated optical delta sigma modulator. Figure 13(a) plots the transfer characteristic of the second order electro-optic delta sigma modulator. As can be seen, the output for both the first order and the second order modulators includes values of from minus 1 up to and including positive 1.

#### **Claim 1**

Claim 1 recites a modulator including an adder configured to add a first nonnegative continuous-time signal and a nonnegative binary output signal to form a first nonnegative intermediate signal and a leaky integrator operably coupled to the adder and configured to receive the first nonnegative intermediate signal and generate

a second intermediate signal therefrom. An inverting bistable device is operably coupled to the integrator and configured to receive the second intermediate signal and to generate the nonnegative binary output signal therefrom. A feedback loop couples the inverting bistable device and the adder to provide the nonnegative binary output signal to the adder.

In contrast, and as described above, Pace describes a delta sigma modulator having an output signal which ranges from a negative 1 to a positive 1, which is known as a bipolar output. Claim 1, however, is distinguishable over Pace and recites a “nonnegative binary output signal.” For support, please see for instance page 2, first paragraph of the summary where it states “The output signal is a binary (0,1) signal.” Binary signals are not bipolar. Consequently, Applicants believe that Claim 1 is allowable in view of the Pace reference.

#### **Claims 2, 3, 5, 9-12**

Claims 2, 3, 11, and 12 depend from claim 1 and contain additional limitations that define over the cited art. Furthermore since claim 1 is believed to be allowable, claims 2, 3, 5, 9-12 are also believed to be allowable. Removal of the rejections and allowance of claims 2, 3, 5, 9-12 is respectfully requested.

#### **Claim 13**

Claim 13, as amended, recites a method for converting a continuous time signal to a binary signal. The method includes the steps of receiving a nonnegative continuous time signal, adding a nonnegative binary output signal to the nonnegative continuous time signal to produce a first nonnegative intermediate signal, processing the first nonnegative intermediate signal through a leaky integrator to produce a second intermediate signal, and processing the second intermediate signal through an inverting bistable device to produce the nonnegative binary output signal.

As described above, Pace describes a delta sigma modulator having an output signal which ranges from a negative 1 to a positive 1, which is known as a bipolar output. Claim 13, as amended, is distinguishable over Pace and recites a “nonnegative binary output signal.” Consequently, Applicants believe that Claim 13 is allowable in view of the Pace reference.

### **Claims 14, 15**

Claims 14 and 15 depend from claim 13 and contain additional limitations that define over the cited art. Furthermore since claim 13 is believed to be allowable, claims 14 and 15 are also believed to be allowable. Removal of the rejections and allowance of claims 14 and 15 is respectfully requested.

### **Allowable Subject Matter**

### **Claims 16-20**

Claims 16-20 are indicated as being allowed. Applicants appreciated the Examiner's indication that these claims are allowable.

### **Claims 5, 9-10, 12 and 15**

Claims 5, 9-10, 12, and 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 5 has been rewritten a claim 21 in independent form including all of the limitations of the base claim and any intervening claims. Claim 21 is believed to be allowable.

Claim 9 has been rewritten as claim 22 in independent form including all of the limitations of the base claim and any intervening claims. Claim 22 is believed to be allowable.

Claim 10 has been rewritten as claim 23 and depends from believed to be allowable claim 22. Applicants believe that claim 23 is allowable as well.

Claim 12 has been rewritten as claim 24 in independent form including all of the limitations of the base claim and any intervening claims. Claim 24 is believed to be allowable.

Claim 15 has been rewritten as claim 25 in independent form including all of the limitations of the base claim and any intervening claims. Claim 25 is believed to be allowable.


### **Final Remarks**

Applicants submit that claims 1-3, 5, and 9-25 are in condition for allowance. In view of the foregoing, it is respectfully submitted that all of the solicited claims are in condition for allowance. Such action is respectfully requested.

Applicants request that, if necessary, this response be considered a request for an extension of time to enable this response to be timely filed. Applicants request that any required fees for filing the response be charged to the account of Bose McKinney and Evans LLP, Deposit Account Number 02-3223. In the event that there are any questions related to these amendments or to the application in general, the undersigned would appreciate the opportunity to address those questions directly in a telephone interview to expedite the prosecution of this application for all concerned.

Respectfully submitted,

BOSE McKINNEY & EVANS LLP

  
Daniel J. Krieger  
Reg. No.: 33,600

Indianapolis, Indiana  
(317) 684-5000

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